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1. INTRODUCTION

1.1 Objectives of Investigation

The objectives of the investigation of the application of HCMM thermal data to snow hydrology (HCMM Investigation No. 036) are as follows:

- (1) Determine practical utility of HCMM thermal IR data to establish distribution of snow cover and determine accuracy of temperature measurements.
 - a. Determine accuracy of surface temperatures acquired through use of HCMM thermal IR measurements.
 - b. Determine relative resolution utility between VHRR and HCMM for thermal IR measurements.
 - c. Specifically delineate and quantify the problems involved with measuring snow temperature from space and relate them to present and planned earth observing satellite systems. This objective will take into consideration and utilize the capability of HCMM for day and night thermal measurements over appropriate sites and the satellite's eight-day repeat cycle.
- (2) Determine if and how HCMM measurements can be factored in with Landsat data into an overall snow hydrology program related directly to snowmelt runoff prediction.
- (3) Develop an approach to automated data processing of combined visible and thermal infrared satellite acquired data to provide information of interest and use to the snow hydrologist.

1.2 Anticipated Results

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The primary anticipated result of the proposed investigation is the development of improved techniques for the mapping and analysis of snow-cover using spacecraft-acquired data. The results will provide an evaluation of the usefulness of high resolution thermal infrared data for snow mapping and for input to snowmelt prediction programs; and will provide a better understanding of the relationships between the measured temperature values and such factors as type of snow, snow depth, type of

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terrain, and vegetation. The mapping and analysis techniques can then be applied to the automatic processing of data from future spacecraft systems, and will eventually enable snow survey, which is a vital part of water resources management, to be accomplished on a more cost-effective basis.

2. ACCOMPLISHMENTS DURING REPORTING PERIOD

During this reporting period, the work on the project was continued at a low level of effort awaiting the receipt of the initial sample of HCMM satellite data and the data from the U-2 mission flown in late spring.

Tapes have been received from U-2 missions flown earlier this year over the Arizona and Sierra Nevada test site areas. Because the quality of these data is questionable, however, we have decided not to expend funds to process the tapes. For example, we have been informed that the thermal IR data from the 1 March flight over Arizona are not useable. Also, the earlier flights over the Sierras have considerable cloud contamination.

A U-2 day/night mission was flown over the Sierra Nevada test site area on 31 May (daytime) and 1 June (nighttime) to coincide with an HCMM pass on 30 May. It is anticipated that useable data should result from this flight. Because of the above normal snowpack and late melt season in the Sierras this year, ample snow cover still existed at the beginning of June. In fact, if an aircraft is available, an attempt will be made to schedule another U-2 flight over the same area late in June; this would provide an opportunity to compare data from two dates during the melt season when the snowpack is undergoing great change.

3. PROBLEMS

No significant problems are anticipated at this time. Of course, because the objectives of the investigation are related to snow hydrology, the late April launch date of the satellite reduces the amount of useful data from this spring season, particularly for the Arizona test site area. Fortunately, however, a sufficient amount of snow cover will

likely remain in the Sierra Nevada test site area right through June because of the above normal snowfall and late melt season of this year. A considerable amount of useful HCMM data should, therefore, be collected during May and June.

4. PLANS FOR THE NEXT REPORTING PERIOD

It is anticipated that the initial data from the satellite, as well as the data from the additional one or two U-2 missions, will be received during the next reporting period. The analysis will be undertaken upon receipt of the data.

5. TRAVEL

No travel occurred during the past reporting period.

6. PUBLICATIONS

No publications have resulted from this investigation.

7. SIGNIFICANT RESULTS

No significant results have been obtained through the third reporting period of the investigation.

8. FUNDS EXPENDED

Approximately 15 per cent of the available funds have been expended to date. It is anticipated that the remaining funds will be adequate to complete the project.

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